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AUTHOR Parette, Howard P., Jr.; VanBiervliet, Alan
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ABSTRACT

A questionnaire examining consumer needs, spending, travel, credit options and utilization practices in adaptive/assistive and educational technology was answered by 2,201 Arkansans with disabilities of all ages. This paper emphasizes results relating to Arkansans with mental retardation. Results indicate Medicare/Medicaid as the single most widely used system for acquisition of assistive technology, and the chief function of technology in use was "getting around," a category including wheelchairs, crutches and other mobility aids. While most respondents expressed satisfaction with the technologies they were using, widespread difficulties were reported in travel (22% reported having to travel over 100 miles to receive their technology) and availability of credit plan options (30% of respondents reported personal or family financing of needed equipment). Consumer rights were called into question by findings indicating 45% of respondents were unable to try out equipment prior to purchase. In addition, training with equipment was generally seen as inadequate. Includes approximately 80 references. (PB)

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Persons with Mental Retardation and Technology Use Patterns and Needs

Howard P. Parette, Jr.

Alan VanBiervliet

Center for Research on Teaching and Learning

University of Arkansas at Little Rock

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Persons with Mental Retardation and Technology Use Patterns and Needs

During the past three decades, changes have occurred regarding the perceptions of mental retardation demonstrated by the general public (*e.g.*, Epstein, Polloway, Patton, & Smith, 1989; Polloway & Smith, 1988; Polloway & Smith, 1983). Recently, for example, Antonak, Fiedler, and Mulick (1989) reported that fewer persons in 1986 believed that persons with mental retardation were unteachable as contrasted to perceptions in 1956 (Winthrope & Taylor, 1957). Others have shown that perceptions of mental retardation and mental illness can now be differentiated (Caruso & Hodapp, 1989). These and other types of studies conducted in recent years have clearly suggested that positive shifts are occurring in regard to the way in which persons with mental retardation are viewed in our society.

Such perceptions have been altered to a great extent by federal legislation. Public Law 94-142, the *Education for All Handicapped Children Act of 1975*, required the provision of a free and appropriate public education for all persons with handicapping conditions in the least restrictive environment. The Rehabilitation Act of 1973, Section 504, forbids discrimination on the basis of handicap, with far-reaching effects on the concept of acceptable design of public and vocational environments. Title XIX of the Social Security Act of 1965 requires facilities receiving federal reimbursement as Intermediate Care facilities to set and follow standards for professional involvement, accountability, active treatment, and client rights. Examining the language contained in these regulations and laws indicates that the need for objective assessment of progress toward goals, for careful planning, and for providing specialized services is explicitly recognized. The 1978 revision of the Developmental Disabilities Act actually defines its target population in functional terms: individuals needing extended intervention prior to age 22 to ameliorate substantial functional limitation in three or more areas. These areas include self-care, language, learning, mobility, self-direction, independent living, and economic self-sufficiency. In part, these types of standards are a reflection, as well as a promotion of a philosophy of normalization (Wolfensberger, 1972) and ultimate functioning (Brown, Nietupski, & Hamre-Nietupski, 1977).

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Coinciding with these changes in societal perceptions of mental retardation has been a proliferation in the applications of technological advancements in the fields of rehabilitation and special education. Unquestionably, technology plays a vital role in the lives of all persons in our society, but, for persons who are mentally retarded, the promise of technology is particularly well-recognized (Cavalier, 1988, 1989; Garner & Campbell, 1987; Vanderheiden & Dolan, 1985). In a general sense, technology for persons with mental retardation offers three potential benefits: (a) the facilitation and automation of therapeutic regimens and educational activities; (b) the provision, restoration, or extension of a person's physical abilities; and (c) the provision of opportunities for greater participation in the mainstream of society (Garner & Campbell, 1987; Vanderheiden & Dolan, 1985).

Definition

Though definitions of technology have varied over the years (*e.g.*, Berdine & Blackhurst, 1985; Elting, 1989; Office of Technology Assessment, 1982), the federal government clearly expressed its recognition of the importance of technology in the lives of all persons with disabilities through the passage of P.L. 100-407, the *Education for All Handicapped Children Act of 1988*. Defined in the context of this federal interpretation, technology is:

> ...any item, piece of equipment, or product system, whether acquired commercially off the shelf, modified, or customized, that is used to increase, maintain, or improve functional capabilities of individuals with disabilities. [29 U.S.C. 2202, Sect. 3(1)]

Practical applications of technology under such a conceptual framework would include the gamut of human devices and services aimed at enhancing the quality of life for *all* persons in our society, thereby facilitating ultimate functioning. For persons with mental retardation, technology which may be frequently seen across a variety of environmental contexts would include such devices and adaptations as computer applications, videodiscs, electronic interfaces, augmentative communication devices, microswitches, and environmental control systems (Berdine & Blackhurst, 1985; Esposito & Campbell, 1987; Garner & Campbell, 1987; Hofmeister & Friedman, 1986; Office of Technology Assessment, 1982; Vanderheiden & Dolan, 1985).

State Systems of Technology-Related Assistance

With the enactment of P.L. 100-407, the federal government established a competitive grants program wherein states could be provided with funding to develop innovative and consumer-responsive systems of technology-related assistance to persons with disabilities. Conceptually, the intent of the legislation is for all states to eventually receive funding under the legislation in the various funding cycles. The specific purposes of the state grants program as delineated under § 345.2 of the regulations are to create and support comprehensive, consumer-responsive, statewide programs of technology-related assistance designed to increase:

(a) Awareness of the needs of individuals with disabilities for assistive technology devices and assistive technology services;

(b) Awareness of policies, practices, and procedures that facilitate or impede the availability or provision of assistive technology devices and assistive technology services;

(c) The availability of and funding for the provision of assistive technology devices and assistive technology services for individuals with disabilities;

(d) Awareness and knowledge of the efficacy of assistive technology devices and assistive technology services among individuals with disabilities, their families or representatives, individuals who work for public agencies and private entities have contact with individuals with disabilities (including insureres), employers, and other appropriate individuals;

(e) The capacity of public and private entities to provide technology-related assistance, particularly assistive technology devices and assistive technology services, and to pay for the provision of assistive technology devices and assistive technology services;

(f) Coordination among State agencies and public and private entities that provide technology-related assistance, particularly assistive technology devices and assistive technology services; and

(g) The probability that individuals of all ages with disabilities will, to the extent appropriate, be able to secure and maintain possession of assistive technology

devices as they make the transition between services offered by human service agencies or between settings of daily living. [29 U.S.C. 2201(b)(1)]

States applying for grants under §345.2 must conduct a preliminary assessment of the needs of persons with disabilities across all groups--including the underserved--and geographic regions of the state for assistive technology services, devices, and support. Similarly, a description of the nature of both state and private sector involvement in the provision of technology and related services as well as continuing role in the provision of such services is required in the grant application. [29 U.S.C. 2212(e)]

The Arkansas Technology Access Program

Certain states would appear to have significant needs to respond to the availability of funding for technology-related services. Arkansas, for example, was rated by the National Health Interview Survey (LaPlante, 1988) as having the greatest proportion of disabled individuals (12.7%) aged 16-64 years of age when compared to all other states. Similarly, the state has also been ranked second in the nation in the per capita number of persons with disabilities of working age (Arkansas Rehabilitation Research and Training Center, 1984). In a recent intensive research study conducted by the Human Services Research Institute (Agosta, Ashbaugh, Langer, Moore, Bradley, Mulkern, & Nurczynski, 1988), it was found that there are over 300,000 persons of all ages who were estimated to have chronic disabling conditions in the total population. Of this group, persons with mental retardation constitute at least 13% of the total population of persons with disabilities.

In examining existing data bases relative to statistics on the population of persons with mental retardation in Arkansas, several trends appear to emerge. The issue of transitional services, for example, is an area in which the state exhibits a substantial deficit. One report (Arkansas Department of Education, 1986) indicated that there were almost 6,000 persons with mental retardation enrolled in public school programs in 1985. The transition to adulthood for many of these students reportedly was anticipated to result in a work activities center or adult development center placement with a nonvocational emphasis and with little or no opportunity for advancement to more integrated and vocational placements. An indeterminate length of time typically elapses between the completion of school services and the initiation of adult services. Work activities and

adult development centers in the state provide long-term static placements for over 1,700 persons with severe disabilities, maintaining waiting lists of approximately 313 persons who are without day services. Reportedly, only 50 of the over 1,700 clients (3%) were placed in competitive employment in 1984 (Woolcock & Smith, 1985).

A significant need also appears to exist in the area of community-based and independent living services for persons with mental retardation in the state. During the past five years, the state has made a commitment towards moving from highly segregated programs to programs aimed at the provision of appropriate services to families and persons with mental retardation in communities where they live. Although this philosophical commitment to community-based services exists at virtually all levels of the various service networks, substantial problems exist in regard to implementation. For example, the number of Human Development Center residents (segregated institutions) has been relatively stable over the past 10 years (Braddock, Hemp, & Fugiura, 1986). The largest proportion of resources is expended on these services, as opposed to more community-based services which are typically viewed by consumers and professionals alike as being more important service delivery alternatives in the context of both normalization and ultimate functioning.

In all areas of life functioning, technology can play a critical role in facilitating optimal participation in our society. Even with the earliest age groups of children with mental retardation, devices which are used early in life become naturally assimilated as a part of our environment (Hansen & Perlman, 1989). By having an awareness early on of *what is possible,* young children can broaden their aspirations, as well as the expectations of others regarding their potential.

A model planning process. In the Spring of 1988, prior to the passage of Public Law 100-407, a cooperative effort to find solutions to problems experienced by Akansans with developmental disabilities was initiated by seven public, private, and consumer agencies. The resulting project, the Technology Access for Arkansans (TAARK) project was designed to: (a) identify the need and quality of technology provisions in Arkansas; (b) to disseminate information about the appropriate technology and funding; (c) to educate Arkansans about technology and funding; (d) to educate Arkansans about technology and advocacy; (e) to develop a coordinated state plan; and (f) to provide technical assistance to the Governor's Developmental Disabilities

Planning Council (DDPC). The project was funded in part through the DDPC and in part through the University of Arkansas-University Affiliated Program (VanBiervliet, 1988). Soon after this project was funded at the state level, the federal technology legislation was enacted in August of 1988 providing the impetus for bi-level planning activity that included the development of a broad state plan addressing the technology needs of persons with disabilities, and preparing a proposal in response to P.L. 100-407.

The processes involved in this unique planning activity have been described elsewhere (VanBiervliet & Parette, 1989a). What is important, however, is that these processes culminated in a grant award under the federal legislation to establish a comprehensive statewide system of technology-related assistance for persons with disabilities.To a large extent, the development of this grant proposal was contingent upon information obtained from a comprehensive needs assessment of persons with disabilities across the state.

This study reports the results of the statewide assessment of the technology needs of persons with mental retardation in Arkansas. The study also focused on a variety of technology utilization patterns for persons with mental retardation, including travel practices, expenditures for technology, technology acquisition strategies, and levels of satisfaction with technology currently being used. Implications derived from the study are presented for the consideration of other potential participants in the federal grant competition processes of P.L. 100-407.

Method

Subjects. Subjects for this study were persons with mental retardation who constituted a subsample of a larger sample of persons with disabilities reported elsewhere (VanBiervliet & Parette, 1989). All subjects were identified by 11 agencies who were providing services to persons with mental retardation in Arkansas. Self reports of mental retardation on a survey instrument by participants in the larger study were the only criteria used for inclusion in the study. As a result, the responses of 680 persons with mental retardation from across the state were used for data analysis purposes.

Instrument. A Consumer Survey instrument was designed through the collective efforts of a central state technology planning committee, and was subjected to review and modification by a larger Coordinated Planning Committee consisting of 48 persons representing 25 public and

private agencies. The instrument was designed to be easily readible by persons having modest reading levels, yet providing information across a variety of areas deemed critical for state technology planning purposes. These areas included satisfaction with technology services, work modification practices, areas of technology usage and unmet needs areas, expenditures for technology, funding mechanisms, travel practices, training, and credit options for the purchase of technology.

Procedure. Mailing lists consisting of names of persons with mental retardation, as well as other disabilities, were submitted by all participating agencies providing services to persons with disabilities in Arkansas. Approximately 12,000 names were generated employing this procedure. Instruments designed for the survey were mailed directly to each of these individuals during April and May of 1989, and included return envelopes to facilitate an acceptable response rate. In order to address the elderly component of the state, the instrument was reproduced in *Arkansas Aging*, a periodical of the Department of Human Services, Division of Aging and Adult Services, which has a circulation of approximately 35,000 persons within the state. The instrument was also reproduced in *arc news*, a monthly newsletter disseminated by the Association for Retarded Citizens/Arkansas to approximately 4,500 persons statewide. Coupled with mailing lists provied by agencies, the latter sources for instrument dissemination resulted in the potential to reach approximately 51,000 persons in the state.

Return envelopes were not included in instruments reproduced in *Arkansas Aging* or *arc news*. It was recognized from the outset that this might adversely affect return rates from the readership of these newsletters. To insure an adequate reponse rate from the aging sector of the state, a second direct mailout to 1200 elderly persons served by six Area Agencies on Aging located across the state was conducted in June of 1989. Return envelopes were included in these instruments.

A total of 2201 survey forms were received from consumers which were usable for data analysis. Only 25 forms were received from persons responding to instruments published in *Arkansas Aging* and *arc news* , indicating that this was an inefficient technique for obtaining information. These returns were not included in final data analysis which included responses generated from the direct mailing to 13,200 persons employing return envelopes. Of this sample,

data from persons reporting mental retardation were examined and included in this report.

Results

The return rate reflected in the statewide survey of persons with disabilities approximated 17%; the subsample of persons with mental retardation constituted approximately 31% of the total respondent class. Demographic information reported by persons with mental retardation indicated the following distribution of respondents by age class: < 3 (n = 13); 3 - 21 (n = 234); 22-59 (n = 371); 60+ (n = 41). The percentage of secondary handicaps reported by the participants was varied: learning problems (68%); speech problems (59%); visual problems (50%); physical handicaps (46%); auditory problems (19%); emotional problems (19%); heart problems (10%); breathing problems (9%); head injuries (6%); and other (15%).

A wide range of technology service delivery mechanisms were reported by the survey participants. The most widely employed system for the provision of technology and technology-related assistance was Medicare/Medicaid with 69% of the the resapondents reporting use of this service model. The second most widely used mechanism reported was the Department of Human Services, Division of Developmental Disabilities Services, with 42% of the participants indicating receipt of technology services through this service model. It is interesting to note that a substantial number of respondents (29%) reported that either their families, or themselves, provided the technology which was currently being used. Private insurance was the next most widely used service mechanism, with 13% of the respondents reporting use of insurance companies to secure needed technology. Other service delivery systems such as public schools, United Cerebral Palsy, Easter Seal Society, and private commercial sources were reported with much less frequency.

Table 1 reports areas of life functioning in which persons with mental retardation indicated usage of technology. It was found that areas of use were reported in all areas of life functioning, ranging from 73% of the respondents in the area of *getting around* (*e.g.*, wheelchairs, carts, canes, and crutches) to 21% in the area of *computer usage*. Conversely, unmet needs were also reported in all areas of life functioning under study in the survey. Unmet needs exceeded use of technology in 7 areas.

Insert Table 1 about here

Respondents were asked to specify their expenses for technology and maintenance in 1988, resulting in a wide range of spending practices. As noted in Figure 1, half of those participating in the survey reported expenses of $500 or less for technology and/or maintenance. Only a small number of participants indicated personal expenses in excess of $500.

Insert Figure 1 about here

The travel practices involved in securing needed technology by persons with mental retardation also reflected a diverse range of behaviors. As noted in Figure 2, while slightly over half of the survey participants reported travel less than 20 miles round trip to obtain the technology they were currently using, a substantial number also reported travel between 21 and 100 miles.

Insert Figure 2 about here

Transportation services were reportedly being provided to 62% of the respondents (n = 360) while 38% (n = 220) indicated not having access to transportation.

Reported in Table 2 are data relating to levels of satisfaction with identified technology-related services. As can be seen, most respondents were given evaluations prior to the receipt of their technology and most also indicated that they were generally satisfied with the services they received for the technolgy that was used. However, more than half also reported a need for more information regarding technology which could potentially be of benefit. A preponderance of respondents noted that no opportunity was provided to them to purchase their technology on some type of credit plan, and more than half the sample reported that, were such an option available to them, it would have been helpful. Most respondents reported having received enough training in the technology which they were currently using, but most also indicated not having had the opportunity to try out their technology before paying for it. More than 1/3 of the participants expressed dissatisfaction with the amount of time required to repair or service their technology.

Insert Table 2 about here

In the area of work activity, respondents were asked whether the employer had changed the work area or equipment to meet the needs of the respondent. Of the 263 persons responding to this item on the survey instrument, 65% reported no changes being needed in their work environment. However, 22% reported that no changes had been made and 13% indicated that such changes had been made.

Discussion

The purpose of this study was to provide an exploratory examination into the technology needs and use patterns of persons with mental retardation within a subsample of persons with disabilities in Arkansas. Since the data were derived from a limited sample of persons with mental retardation in the only one geographical region of the country, generalizations to other state studies must be done with extreme caution, particularly in light of the interstate and and intrastate variance in mental retardation (Keogh & MacMillan, 1983; Patrick & Reschly, 1982). Also, the findings are based on self-reports of respondents participating in the study, and the reliability of these reports may be questionable.

Specified findings suggest the nature of the sample under study, and reflect implications for practitioners who are involved in planning processes for the development of state technology service delivery models in response to P.L. 100-407.

Demographic characteristics. These data would suggest that for the sample under study, difficulties ancillary to mental retardation are prominent. While it has been well-recognized for many years that persons with moderate and severe/profound mental retardation typically have other associated problems (Snell & Renzaglia, 1986; Valletutti & Sims-Tucker, 1984), recent studies have also indicated that associated, or multiple handicaps are common among persons with mild mental retardation (*e.g.*, Epstein et al. 1989; Hallahan & Kauffman, 1986; Linden & Forness, 1986). The high incidence of related disabilities, particularly speech, visual, and physical impairments, lend support to the notion that for persons with mental retardation, the occurrence of associated problems is a common phenomenon.

Agencies providing technology services. The finding that the Medicare/Medicaid systems

are primary service delivery mechanisms for the technologies received by persons with mental retardation is not surprising. Medicare, established under Title XVIII, is a federally managed medical insurtance plan, regardless of income, for persons age 65 and older and for persons under age 65 who are eligible for Social Security Disability Insurance (SSDI). Medicare expenditures generally fall into two categories: hospital insurance (Part A) and supplementary medical insurance (Part B). Coverage under Part A is financed by a portion of Social Security payroll taxes, and pays for inpatient hospital care, skilled nursing care, and home health care. Part B coverage is financed by general revenues with premiums paid by beneficiaries that helps pay for physician services, outpatient services, hospital costs, some short-term rehabilitation services, therapies, durable medical equipment, laboratory services and supplies. In order for a technology need to qualify for Medicare payment, it must meet a three-pronged test: (a) Is it a replacement of a necessary body part or function? (b) Is it a medical necessity? and (c) Is it of reasonable cost? Although the term technology is not specifically couched in the language of the legislation, payment may be considered if the technology meets the aforementioned test.

Medicaid, in particular, is a widely used system for persons with disabilities seeking to acquire needed technology. Established under Title XIX of the Social Security Act of 1965, Medicaid is structured as a federal/state system, wherein each state is responsible for the overall administration of its respective program, with the federal government sharing in the costs. Title XIX requires each participating state to cover a core set of benefits for the catgorically needy, including: inpatient and outpatient hospital services; skilled nursing facility services; physician services; home health care services; early and periodic screening, diagnosis, and treatment (EPSDT) services; and other laboratory and x-ray services (42 CFR § 440.210). Generally speaking, durable medical equipment (DME) is traditionally covered by most Medicaid agencies, e.g., manual wheelchairs, crutches, walkers, and hospital beds. Beyond these core services, each state has the option of providing a broader array of benefits with federal matching funds available (42 CFR, Part 440). Technology has some interesting coverage patterns under the language of Title XIX. As an example, "medical supplies, equipment, and appliances suitable for use in the home" [42 CFR § 440.70(b)(3)] are covered as core benefits, since they are delivered as part of home health care services, which are core benefits. In contrast, "prosthetic devices" that are

designed to (a) artificially replace a missing body part, (b) prevent or correct a physical deformity or malfunction, or (c) support a weak or deformed body part [42 CFR § 440.120(c)] are listed as optional benefits under federal regulations. As a result, states vary widely with regard to payment for artificial limbs and braces (Markowicz & Reeb, 1989). Some states have ventured beyond the provision of DME, including such technologies as sensory and communication devices, seating and positioning systems, environmental control equipment, and architectural control elements (Markowicz & Reeb, 1989; Mendelsohn, 1989. Also,"waiver" programs are being initiated in numerous states enabling agencies to waive certain Medicaid requirements on a demonstration basis. These waiver requests are judged to the extent that they propose "improvements in the provision of services under Medicaid to be cost-effective, efficient, and consistent with the objectives of the Medicaid program" [42 CFR § 431.55(a)]. What is important is that the potential for the incorporation of assistive technology devices and services hinges to a large degree on state level developments, since in each state considerable discretion exists regarding the types of technology and services to be covered under Medicaid. Such decisions are amenable to local influence and political processes in ways that federal processes are not (Mendelsohn, 1989).

The burden of providing needed technology to persons with mental retardation being shifted to families or users seems to be indicated among the sample under study. In light of the finding that almost 30% of the participants reported personal or family purchase of needed technology, a glaring void in existing service systems emerges. The need for more creative alternatives for purchasing needed technology has been frequently expressed by consumers of technology and service providers alike in recent years (Governor's Task Force on Technology and Disabilities, 1987; Mendelsohn, 1989; Office of Technology Assessment, 1982; Reeb, 1987; Technology Access for Arkansans, 1989). More than 3/4 of participants who responded to a question regarding the availability of a buy-on-time, or credit plan, to purchase their technology, reported not having had such an opportunity. Of those who reported not having had such an opportunity, more than 1/2 voiced concerns that time payment plans *would have been helpful* to them in purchasing technology. Subsequent to the recomendation made by the Office of Technology Assessment (1982), numerous strategies at varying levels have been demonstrated to address the needs of persons with disabilities for credit-based funding systems. Examples are

evident at the state level in the direct loan model established under the New York State Equipment Loan Fund for the Disabled and California's Handicapped Transportation and Supported Employment Loan Guarantee Programs (Mendelsohn, 1989). At the private sector and nonprofit agency level alternatives are being developed across the country in this regard, each being developed with the rationale that with good planning, persons with disabilities are good risks for loans and credit purchases (Governor's Task Force on Technology and Disabilities, 1987; Mendelsohn, 1989).

Private insurance, while recognized as an important potential source of payment for persons with mental retardation seeking funding for necessary technology (Reeb, 1987), appeared to be used relatively infrequently by participants in this survey. At least two critical considerations must be posited in response to this finding. First, in any individual insurance policy, there are key decision-makers responsible for what is or is not going to be purchased for the persons covered under the policy. These key persons may be physicians, other clinical professionals, case managers and/or claims examiners/adjustors, as well as the family. All payment options will be constrained to some degree by the terms of individual private insurance contracts. Thus, decisions will be consistent with the letter of the contractual agreement and with other insurer obligations, including those of its shareholders. This suggests a dual approach to developing an understanding of how private insurance might pay for the technology needed by persons with mental retardation. It is important to study the policy, or policies under which the person is covered, giving particular attention to the obligations of the insurance company and the types of technology and related services that are covered under the policy. Also, policy-holders should identify key decisonmakers within private insurance companies and develop a working rapport with them. This will facilitate an understanding of of the perspectives of those persons as well as to expedite payments for technology needed by persons with mental retardation that are consistent with insurer constraints.

Given the significant role which public schools play in the lives of persons with mental retardation, it would be expected that many technologies would be funded through the mechanisms of P.L. 94-142, or its sister legislation, P.L. 99-457. Both laws contain language in the related services provision which implicate the provision of assistive technology if it can enable this

population to benefit from special education services. However, for this sample of persons with mental retardation, only 3% of the respondents reported that their technologies were funded through the public schools even though 34% (n = 234) of this subsample were of school-age. In view of the tremendous problems currently faced by the entire system created under these laws, and in light of looming threats to the integrity of these programs (Mendelsohn, 1989), it is difficult to assume that assistive technology will demand a great deal of attention from administrators and most practitioners for some years to come. Regardless of this somewhat bleak observation, progress is being made across the country with regard to the utilization of technology in planning processes and direct service provision to students with mental retardation. Computerized IEP programs are now available and are being subsidized with state appropriations (Office of Technology Assessment, 1988; Soloman, 1988). Similarly, school systems are attempting to incorporate assistive technology into initial procuremens early on in the educational careers of students so as to minimize add-on costs. Finally, school systems are beginning to explore the possibilities of multi-student use of technology, thereby lowering ther costs to educational systems (Mendelsohn, 1989; Office of Technology Assessment, 1989).

Technology acquisition practices. Coinciding with the aforementioned findings was the report that almost 45% of the repondents were unable to try out their technology before paying for it. Consumers who are nondisabled typically enjoy the freedom of having access to goods in our society, and being able to try them out prior to purchasing them. Unfortunately, persons with mental retardation are more often than not denied such access when in the situation of having to purchase needed technology. Consequently, they must rely on the judgments of the professionals involved in selecting the technologies for them. The opportunity for consumers to try out a particular technology before they, or a funding agency, makes a financial investment in it is considerably important in view of the current practice of requiring full payment before an assistive device is ordered (Pfrommer, 1984). Many times, the technologies are selected primarily because they are familiar to the professional, or because competing interests are existent, *e.g.*, the professional is a consultant for a company/vendor of the technology (Cavalier, 1989). In other instances, technologies may be selected solely due to fiscal considerations. In either instance, inappropriate technologies may be acquired for the person with a disability (Cavalier, 1989; Issue

Team on Technology for People with Disabilities, 1986; Office of Technology Assessment, 1982; Pfrommer, 1984).

What is particularly interesting was the finding that 15% of the survey respondents with mental retardation were not given evaluations prior to the purchase of their technology. While it is not known what types of technologies were acquired by this small subgroup of respondents, and what their funding source was for the technology acquired, it might be speculated that families, or the consumers, purchased such technologies independent of agency or third party payment. It is difficult to imagine that either Medicare or Medicaid--the largest reported funding source for the survey respondent class--would fund technology without some type of evaluation being conducted. It might also be that some respondents were given evaluations and were unaware that they were being conducted. At the very least, it is suggestive that there is a need for greater involvement of service providers in evaluating and prescibing technology for persons with mental retardation, as well as for making consumers aware of the need for appropriate evaluations to most efficiently identify technology best suited to meet their unique needs.

Training needs. Interestingly, a moderate percentage of the study respondents reported having not received enough training in the use and care of their technology (32%). Training in the proper and efficient use of any technology is imperative if the fullest benefits are to be derived from the technology. For this particular sample of persons with mental retardation, it would appear that a considerable need exists for professionals in the various service delivery systems serving this population to focus on this expressed need of persons who have mental retardation and who are users of technology.

Levels of satisfaction with technology services. In examining the reports of satisfaction with technology services provided to persons with mental retardation, several interesting trends appear to emerge (see Figure 2 and Table 2). First, there are levels of dissatisfaction in *all* categories reported by consumers. The area in which services appeared to be the most deficient was that of transportation, as 62% of the consumer respondents (n = 580) reported not having such services provided to them. Transportation admittedly is a crucial service for persons with mental retardation, particularly in states that have a rural profile such as Arkansas where there is a tendency to centralize resources in the larger metropolitan areas. Without transportation to services

which are geographically centralized, consumers may be systematically denied necessary technology and related services that can enhance the quality of their lives (Governor's Task Force on Technology and Disabilities, 1987).

This reported lack of transportation services by a majority of the participants in the survey is interesting in light of responses pertaining to satisfaction with technologies received. More than 80% of the consumers voiced satisfaction with their technology and related services, and yet 59% of the respondent group also wanted *more information* about technology which could help them. At the very least, this is suggestive that concerns are present regarding existing technologies being used by respondents. Consumers are either more unsatisfied than they have reported, or they feel that there may be something better currently available to assist them. In any event, a need exists for greater dissemination of information within the system, as well as an enhanced transportation component to get people to the services that they need (Department of Human Services, Division of Rehabiltation Services, 1989; Technology Access for Arkansans, 1989).

Also, it would appear that there is a significant need for more creative alternatives for purchasing needed technology by the respondents with mental retardation in this study. More than 3/4 of the total respondents reported not having had the opportunity to buy their technology on some type of credit or time payment program. Of those who reported not having had such an opportunity, almost 1/2 voiced concerns that time payment plans would have been helpful to them in purchasing technology. Credit-based funding systems have been acknowledged as being important components of any technology service delivery system (Mendelsohn, 1989; Office of Technology Assessment, 1982; Technology Access for Arkansans, 1989). Subsequent to the recomendation made by the Office of Technology Assessment (1982), numerous strategies at varying levels have been demonstrated to address the needs of persons with disabilities for credit-based funding systems. Examples are evident at the state level in the direct loan model established under the New York State Equipment Loan Fund for the Disabled and California's Handicapped Transportation and Supported Employment Loan Guarantee Programs (Mendelsohn, 1989). At the private sector and nonprofit agency level alternatives are being developed across the country in this regard, each being developed with the rationale that with good planning, persons with disabilities are good risks for loans and credit purchases (Governor's Task Force on

Technology and Disabilities, 1987; Mendelsohn, 1989).

Coinciding with the aforementioned finding was the report that almost 45% of the total consumer repondents were unable to try out their technology before paying for it. While the average citizen in our country typically enjoys the privilege of examining a good prior to purchasing it, persons with mental retardation are more often than not denied such access to their technologies and must rely on the judgments of the professionals involved in selecting the technologies for them. The opportunity for consumers to try out a particular technology before they, or a funding agency, makes a financial investment in it is considerably important in view of the current practice of requiring full payment before an assistive device is ordered (Pfrommer, 1984). Many times, the technologies are selected primarily because they are familiar to the professional, or because competing interests are existent, e.g., the professional is a consultant for a company/vendor of the technology (Cavalier, 1989). In other instances, technologies may be selected solely due to fiscal considerations. In either instance, inappropriate technologies may be acquired for the person with a disability (Cavalier, 1989; Issue Team on Technology for People with Disabilities, 1986; Office of Technology Assessment, 1982; Pfrommer, 1984).

Given the significant role which public schools play in the lives of children with disabilities, it would be expected that many technologies would be funded through the mechanisms of P.L. 94-142, or its sister legislation, P.L. 99-457. Both laws contain language in the related services provision which implicate the provision of assistive technology if it can enable children to benefit from special education services. However, for this sample of persons with disabilities, only 10% of the 234 respondents of school age reported that their technologies were funded through the public schools. This seems to suggest that children with mental retardation who are being served by the public schools and who are using technology are having to utilize other mechanisms for funding of those technologies. In view of the tremendous problems currently faced by the entire system created under P.L. 94-142 and P.L. 99-457, and in light of looming threats to the integrity of these programs (Mendelsohn, 1989), it may be that the funding of needed technology for persons with mental retardation will not be a primary concern for administrators for some years to come. Despite this somewhat pessimistic observation, progress is being observed across the country regarding the utilization of technology in planning processes and direct service

provision to students with disabilities. Computerized IEP programs are now available and are being subsidized with state appropriations (Office of Technology Assessment, 1988; Soloman, 1988). Similarly, school systems are attempting to incorporate assistive technology into initial procuremens early on in the educational careers of students so as to minimize add-on costs. Finally, school systems are beginning to explore the possibilities of multi-student use of technology, thereby lowering ther costs to educational systems (Mendelsohn, 1989; Office of Technology Assessment, 1989).

Areas of technology usage and unmet needs. The key questions to be explored in the data in Table 1 focus on the areas in which persons with mental retardation most often use technology, and in what areas these persons exhibit unmet needs. It is apparent that almost 3/4 of the respondents use technology designed to facilitate movement in the environment, *e.g.*, wheelchairs, carts, canes, and crutches. Similarly, the use of technology for self-help activities was reported by a large number of the survey respondents. Without question, the ability to move from one place to another in the environment is an important major life activity (Summers, 1986) which is critical for optimal interactions with the environment that facilitate learning opportunities (Fink, 1982). Technology usage by survey respondents was reported in all other areas of life functioning, ranging from 62% in the area of work and work training, to 21% in the area of computer usage. What is particularly instructive in the data reported in Table 1 is that respondents reported unmet needs *in all areas of life functioning*. It is an important finding that unmet needs were reported by more than 3/4 of the respondents in the area of computer usage. The infusion of computers and the development of advanced interactive technologies in the public school systems, for example, has demonstrated positive effects on academic performance, motivation, and dedication to learning (Office of Technology Assessment, 1988). Even with persons having severe disabilities, applications of computers and computer-driven devices have opened a whole new range of opportunities for these persons (Garner & Campbell, 1987), enabling the training of cognitive skills (Behrman, 1984; Hanline, Hanson, Veltman, & Spaeth, 1985), providing more opportunities for instruction (Hoffmeister & Friedman, 1986), and enabling these persons to perform a wide range of functional activities in integrated environments (Esposito & Campbell, 1987). Unmet needs in six other areas (*hearing aids and other devices; reading,writing, and*

typing; building accessibility; talking with others; using a telephone; and *artificial limbs, braces, and prostheses*) were reported by 50% or more of the respondents. These areas generally suggest that, for this sample, there are existing limitations and unmet needs in areas that contibute to optimal mobility in the environment and communication with others, both of which are major areas of life functioning in the lives of persons with mental retardation (Boggs & Henney, 1979; Gollay, 1979; Summers, 1986).

Expenditures for technology. It is noteworthy that 50% of the respondents with mental retardation (n = 244) reported personal expenditures of less than $500 in 1988 to purchase technology. While no attempt was made in the design of the survey instrument to examine the specific types of technology which were purchased by these consumers, most of these persons reported satisfaction with their devices that they were using with only 10% of this group reported dissatisfaction with their technology.

Travel practices. A particularly interesting finding in the study was that 30% of the respondents with mental retardation reported travel in excess of 50 miles to receive their technology. This is supported by the reports of 62% of the participants that no transportation services were being provided to them. In states wherein service agencies are centralized in more urbanized areas, many persons who are in need of technology must sometimes travel considerable distances to receive necessary services (Technology Access for Arkansans, 1989). For this particular sample of persons with mental retardation, some support for this position seems justifiable. What is not known is the extent to which mass transportation systems are being utilized by persons with mental retardation. Under P.L. 88-365, the *Urban Mass Transportation Act of 1964,* financial assistance is provided to states to meet the transportation needs of persons with handicapping conditions where public transportation services are unavailable, insufficient, or unavailable [49 U.S.C. 1601 et seq.]. In Arkansas, a commitment to meeting the transportation needs of persons with disabilities has been expressed by the Highway and Transportation Department, though considerable needs exist currently with regard to an expanded range of transportation services available to this population (VanBiervliet & Parette, 1989b).

Conclusion

Though these findings are but preliminary in nature, they reflect one of the first attempts

documented (see RESNA, 1989) to systematically examine the technology needs of persons with mental retardation on a state level. Data gained from this investigation will be incorporated into the planning processes currently underway to establish a comprehensive technology service delivery system for persons with disabilities.

Though technology holds exciting possibilities for enhancing the quality of life for persons with mental retardation, the promise can only become a reality as attitudes toward the potential and value of these persons evidence a corresponding change. Professionals must continue to strive to increase their own knowledge base regarding the scope of technologies which are available for persons with mental retardation, recognizing that no technology is a substitute for valued outcomes such as successful transitions into the world of work and independence in one's daily living activities, but rather that it is a tool to facilitate ultimate functioning across social, vocational, and domestically integrated adult community environments.

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Table 1

Areas of Assistive Devices/Services Used and Areas of Unmet Needs as Reported by Consumer Survey Respondents (n = 680)

Area	n of Use	%*	n of Unmet Need	%*
Getting Around	179	.73	67	.27
Self-Help	234	.69	105	.31
Work & Work Training	150	.62	91	.38
Recreation	185	.59	130	.41
School Training	146	.59	102	.41
Taking Care of Home	151	.59	106	.41
Things That Help You See	101	.59	71	.41
Specialized Seating	78	.53	68	.47
Specialized Cars, Vans, & Buses	108	.52	98	.48
Artificial Limbs, Braces, & Prostheses	67	.50	68	.50
Using a Telephone	99	.49	102	.51
Talking with Others	122	.48	132	.52
Building Accessibility	99	.48	109	.52
Reading, Writing, & Typing	96	.42	135	.58
Hearing Aids & Other Hearing Devices	53	.41	76	.59
Using a Computer	44	.21	161	.79

* Indicates % of respondent class

Table 2

Reports of Satisfaction with Technology Services Provided to Consumer Survey Respondents (n = 680)

Question	n Yes	%*	n No	%*
Were you given an evaluation before getting your assistive device?	371	.85	64	.15
Are you satisfied with the services you receive for assistive devices you use?	350	.81	82	.19
Did you have the opportunity to buy assistive devices/services on a "buy-on-time", or credit plan?	77	.22	278	.78
If not, would a "buy-on-time", or credit plan help?	155	.53	136	.47
Have you received enough training in the use and care of your assistive device?	205	.68	97	.32
Were you able to try out the device before paying for it?	124	.44	156	.56
Are you satisfied with the time it takes to repair/service your device?	171	.68	80	.32
Do you need more information about assistive devices/services that could help you?	326	.59	224	.41

* Indicates % of respondent class

Figure Caption

Figure 1. Reports of expenditures for technology in 1988.

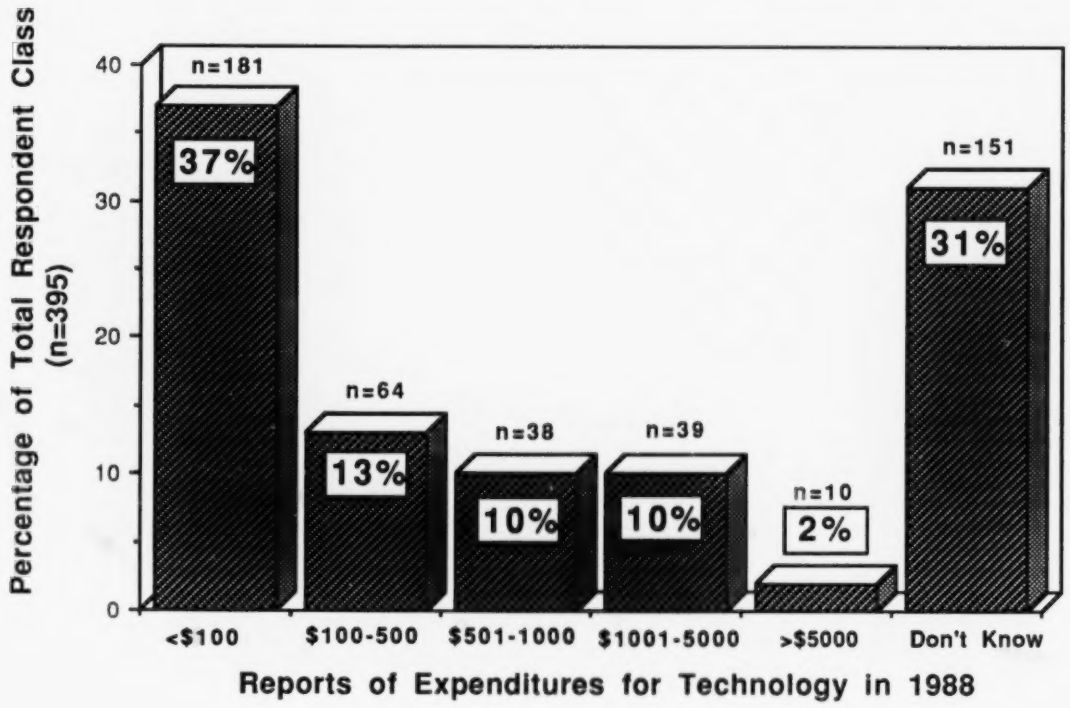
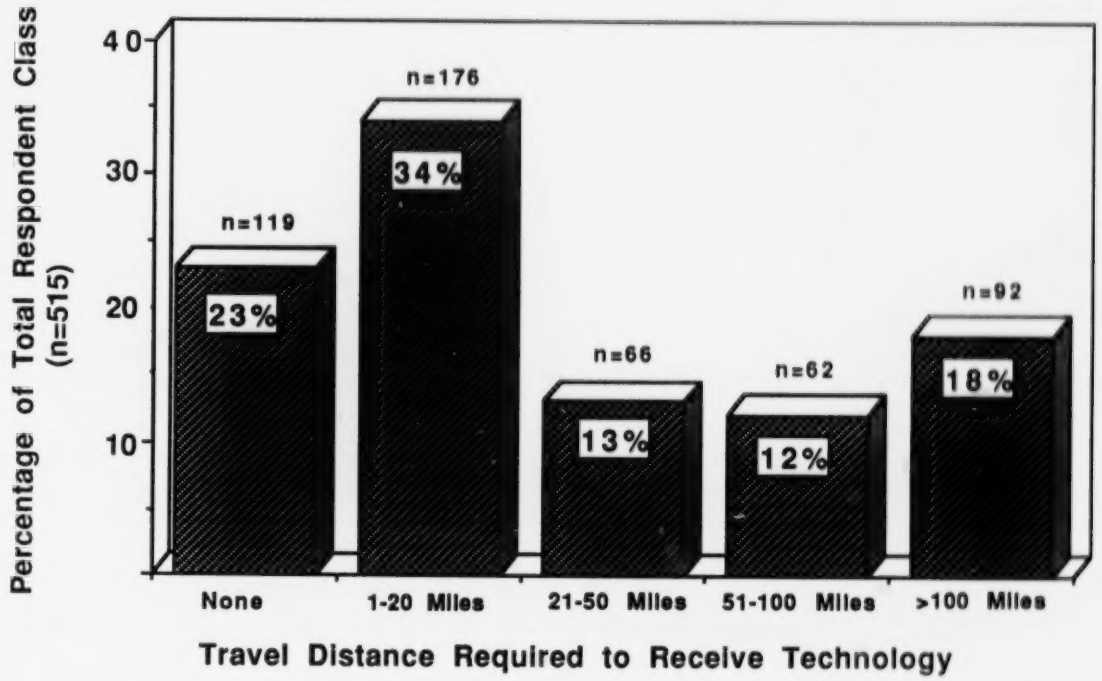

Percentage of Total Respondent Class (n=395)
40
30
20
10
0
n=181
37%
n=64
13%
n=38
10%
n=39
10%
n=10
2%
n=151
31%
<$100
$100-500
$501-1000
$1001-5000
>$5000
Don't Know
Reports of Expenditures for Technology in 1988

Figure Caption

Figure 2. Travel distance required to receive technology.


Percentage of Total Respondent Class (n=515)
40
30
20
10
n=119
23%
n=176
34%
n=66
13%
n=62
12%
n=92
18%
None
1-20 Miles
21-50 Miles
51-100 Miles
>100 Miles
Travel Distance Required to Receive Technology